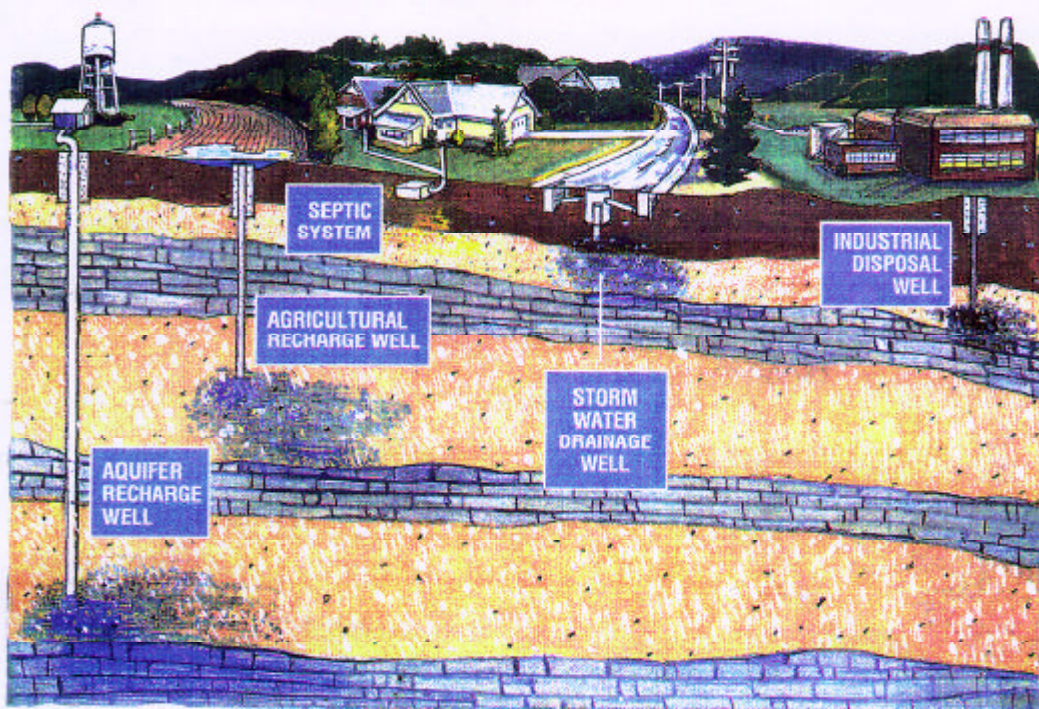


GUIDELINES FOR CLOSURE
OF
SHALLOW DISPOSAL WELLS



1992

III. LABORATORY SELECTION	6
IV. CLASS IV AND V WELL CLOSURE GUIDELINES	7
V. SAMPLING METHODS AND PROCEDURES	19
A. Sampling Equipment	19
B. Equipment Decontamination	20
C. Quality Assurance/Quality Control	20
1. Trip Blanks	20
2. Equipment Blanks	21
3. Replicate Samples	21
4. Split Samples	21
5. Spiked Samples	21
6. Field Blanks	21
D. Sample Analysis	22
E. Sample Collection - Liquid and Sediment	22
1. Volatile Organics	22
2. Semi-Volatile Organics	23
3. Metals	24
4. Total Petroleum Hydrocarbons (TPH)	25
5. Total Recoverable Petroleum Hydrocarbons (TRPH)	25
F. Sample Collection - Soil	25
G. Common Sampling Errors	29
H. Chain of Custody	29
REFERENCES	32

Industrial and Sanitary Wastes or Only Industrial Wastes - Plan View	15
Figure C-2: Drywell, Cesspool, or Drainage Well Receiving Both Industrial and Sanitary Wastes or Only Industrial Wastes - Side View	16
Figure D-1: Leachfield/Infiltration Gallery Receiving Both Industrial and Sanitary Wastes or Only Industrial Wastes - Plan View	17
Figure D-2: Leachfield/Infiltration Gallery Receiving Both Industrial and Sanitary Wastes or Only Industrial Wastes - Side View	18
Figure E - Chain-of-Custody Form	31

LIST OF TABLES

Table I - Sampling Methods	27
Table II - TCLP Sampling Methods	28

aquifers a few feet beneath the ground surface to aquifers that are thousands of feet deep containing up to 10,000 parts per million of dissolved solids, usually in the form of salts. Over 50% of the U.S. population relies on these aquifers for drinking water, and the percentage is increasing every year.

Disposal wells covered by the UIC program include bored, driven or drilled shafts or dug holes whose depth is greater than the largest surface dimension, where the principal function of the shaft or hole is the emplacement of fluids. Under certain conditions, sumps, septic tanks, cesspools and drainfields may also be considered disposal wells. For the purposes of the UIC program, a fluid is any material or substance which flows or moves, whether in a semisolid, liquid, sludge, gas or any other form or state. Contaminants introduced into underground sources of drinking water through the use of disposal wells include bacteria and viruses, minerals and nitrates, heavy metals, organic chemicals and pesticides.

Most types of disposal wells are subject to construction, performance and monitoring requirements designed to ensure that no contamination of underground sources of drinking water occurs through their use. Wells that discharge fluids into or above an underground source of drinking water are generally classified as shallow disposal wells and are not always subject to these requirements. The disposal of hazardous fluids into shallow wells (Class IV wells) is prohibited under the SDWA. However, many shallow wells (Class V) accept fluids that are not defined as hazardous, but still have a potential to contaminate underground sources of drinking water. EPA Region IX is requesting closure of such wells.

This guidance is designed to aid in the proper closure of shallow disposal wells. In addition to providing guidelines for the closure of these wells, general information is included concerning sampling equipment, methods and procedures for collecting liquid, sediment and soil samples; required methods of sample analysis; contractor and laboratory requirements; and sample chain of custody requirements.

To ensure that the contractor has the qualifications - through a combination of education and experience - to perform sampling and site assessment requirements, EPA Region IX requires that:

1. The contractor submit an acceptable sampling plan which addresses:
 - a. types of sampling containers and their preparation
 - b. sample preservation methods
 - c. sampling equipment and method of sample retrieval
 - d. familiarity with specified sampling methods
 - e. certified lab to which samples will be sent
 - f. chain of custody
2. The individual signing any report related to a workplan for closure of a well or a sampling plan must be a professional geologist or a civil engineer registered with the state. This individual shall be responsible for the content, validity and completeness of the report. All reports related to well closure activities shall include the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

be submitted with the sampling plan. For more information regarding laboratory selection, see the reference section of this document.

(See also: For an element of proper well closure, Region IX may require cleanup of soil and/or groundwater in and around the Class IV or V well.

To meet EPA requirements, well closure should, at a minimum, include the elements of the following guidelines:

1. Provide an acceptable alternative for disposal of waste fluids. The alternative must comply with all regulations such that no violation or future violation of primary drinking water standards will result. EPA requests the use of management practices that reduce the amount of contaminants released into the environment through product changes, improved operating practices, reuse of materials, onsite closed-loop recycling, on and off-site reclamation, and water conservation.
2. Identify the locations of all drains, drain lines, drywells, and cesspools or septic systems at the facility.
3. Contact EPA at least seven (7) days in advance of any site operations relating to closure activities.
4. Take representative samples from the liquid and/or sludge phase present in the drain(s) and the well(s) or septic tank(s) in accordance with the procedures described in "Sampling Methods and Procedures" under "Sample Collection". Have the samples analyzed for volatile organics, metals, total petroleum hydrocarbons and oil and grease in accordance with the methods described under "Sample Analysis" and, if necessary, prepared in accordance with the methods for the Toxicity Characteristic Leaching Procedure (TCLP) in 40 C.F.R. Part 261 Appendix II as amended June 29, 1990. Copies of sampling and analysis results, and results of all quality control samples, must be submitted to EPA.
5. Remove the contents from the drains and drain lines and the well(s) or septic tank(s) and determine appropriate disposal methods based on the results of the sample analyses. The owner/operator is ultimately responsible for proper disposal of all wastes, and should carefully review all arrangements for disposal to ensure compliance with federal, state and local regulatory requirements.

The septic tank should have the contents removed and disposed of appropriately. If a visual inspection of the tank indicates cracks or leaks, the tank and any visibly contaminated soil in the vicinity should be removed and disposed of appropriately. Soil samples should be taken below the bottom of the tank excavation in the manner described in "Sampling Methods and Procedures" under "Sample Collection" and analyzed by a certified analytical laboratory. If the tank does not have any cracks or leaks, soil samples may be taken at either end of the tank at a depth that is at least as deep as the bottom of the tank. The tank may then be used for sanitary waste only, and the drain pipes leading from the restrooms need not be disconnected. Soil samples must also be taken along every twenty feet of drainfield or leachfield and sent to a certified laboratory for analysis. It is recommended that soil samples be taken at other locations where there is a potential for a high degree of contamination (worst-case locations) such as elbows and joints in pipe lines, floor drains and clarifiers. All soil samples should be analyzed according to the methods in "Sampling Methods and Procedures" under "Sample Analysis". In addition, at least two soil samples, taken at the worst-case location around either the tank or drainfield, must be both analyzed for total concentrations and prepared in accordance with the methods for the Toxicity Characteristic Leaching Procedure (TCLP) in 40 C.F.R. Part 261 Appendix II as amended June 29, 1990. See Figures A-1 and A-2 for required and recommended soil sample locations.

Case B: Septic system accepting only industrial wastewater into a septic tank and drainfield or leachfield.

The septic tank should have the contents removed and disposed of appropriately. Any visibly contaminated soil in the vicinity of the tank should be removed and disposed of appropriately. If the tank has cracks it should be removed and disposed of properly. Soil samples should be taken below the bottom of the tank excavation in the manner described in "Sampling Methods and Procedures" under "Sample Collection" and analyzed by a certified analytical laboratory. Soil samples must also be taken along every twenty feet of drainfield or leachfield. It is recommended that soil samples be taken at other suspected worst-case locations such as elbows and joints in pipe lines, floor drains and clarifiers. All soil samples should be analyzed according to the methods in "Sampling Methods and Procedures". In addition, at least two soil samples, taken at the worst-case location around either the tank or drainfield, must be both analyzed for

contents removed and disposed of appropriately. It is required that the well casing be removed if it is practicable. Any visibly contaminated soil underlying the contents of the well should be removed. Soil samples should be taken in the center of the bottom of the well in the manner described in "Sampling Methods and Procedures" under "Sample Collection" and analyzed by a certified analytical laboratory. If taking samples from the bottom of the well is not feasible, samples should be taken on opposite sides of the well, at a distance not to exceed one foot away from the borehole, and starting at a depth that is equivalent to the depth of the bottom of the well. It is recommended that soil samples be taken at other suspected worst-case locations such as elbows and joints in pipe lines, floor drains and clarifiers. All soil samples should be analyzed according to the methods in "Sampling Methods and Procedures". In addition, at least two soil samples, taken at the worst-case location, must be both analyzed for total concentrations and prepared in accordance with the methods for the Toxicity Characteristic Leaching Procedure (TCLP) in 40 C.F.R. Part 261 Appendix II as amended June 29, 1990. The remaining hole where the well has been removed should then be filled with grout and sealed with asphalt or cement. See Figures C-1 and C-2 for required and recommended soil sample locations.

Case D: Leachfield/filtration gallery accepting sanitary and industrial wastewaters, or only industrial wastewaters.

The practice of disposing sanitary and/or industrial wastewaters directly to a leachfield/filtration gallery without the use of a septic tank is unacceptable. The leachfield should be excavated, and all visibly contaminated soils removed and disposed of appropriately. Soil samples must be taken along every twenty feet of drainfield or leachfield in the manner described in "Sampling Methods and Procedures" under "Sample Collection" and sent to a certified laboratory for analysis. It is recommended that soil samples be taken at other suspected worst-case locations such as elbows and joints in pipe lines, floor drains and clarifiers. All soil samples should be analyzed according to the methods in "Sampling Methods and Procedures". In addition, at least two soil samples, taken at the worst-case locations in the drainfield or leachfield, must be both analyzed for total concentrations and prepared in accordance with the methods for the Toxicity Characteristic Leaching Procedure (TCLP) in 40 C.F.R. Part 261 Appendix II as amended June 29, 1990. The area should be regraded using clean fill. See Figures D-1 and D-2 for required and recommended soil sample locations.

- Copies of all fluid, sludge and soil samples analysis results, and results of all quality control samples.
- Copies of manifests or other documentation pertaining to proper disposal of all removed liquid, sludge and soil.
- A description of the extent of site contamination. Should site remediation appear necessary, recommendations from a registered geologist or registered civil engineer, with sufficient experience in soils, should be included to address the problem.

10. Include, on all reports submitted to EPA that relate to well closure activities, the certification given in "Requirements for Contractors".

These guidelines do not constitute a remediation plan. It is the responsibility of the owner or operator to ensure that further site evaluation be conducted if analytical results of the soil samples indicate the presence of contamination.

All submittals are to be sent to:

Underground Injection Control Section
U.S. Environmental Protection Agency
75 Hawthorne Street, W-6-2
San Francisco, CA 94105

Case A: Soil Sample Locations for a Septic System Receiving Both Industrial and Sanitary Wastes

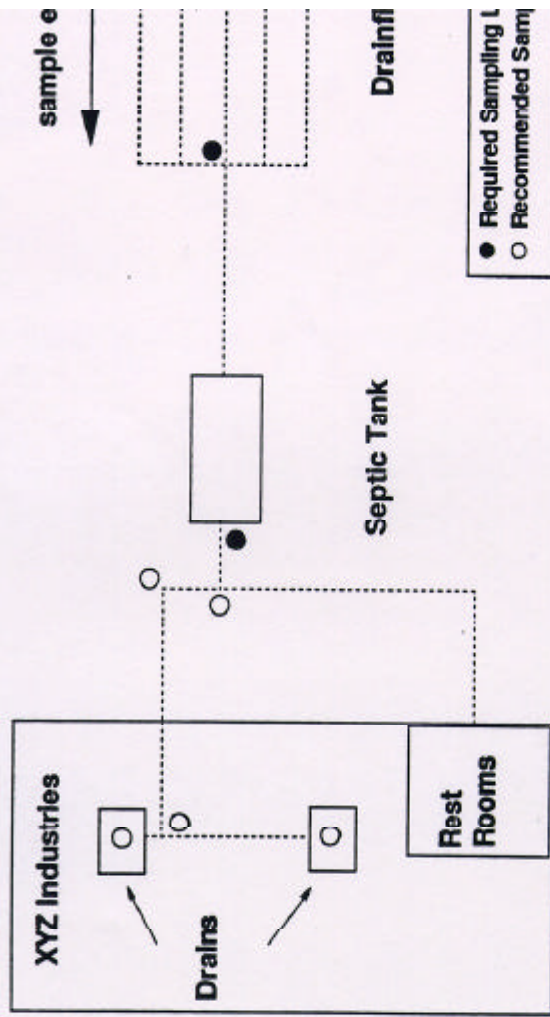


Figure A-1: Plan View

3: The soil sample locations shown above meet the minimum requirements of the EPA UIC Program (or operator of the well is also responsible for meeting the requirements of all other applicable federal, state, and local laws, regulations, and orders) and for adequately assessing the extent of any soil or ground water contamination.

Case A: Soil Sample Locations for a Septic System Re Both Industrial and Sanitary Wastes

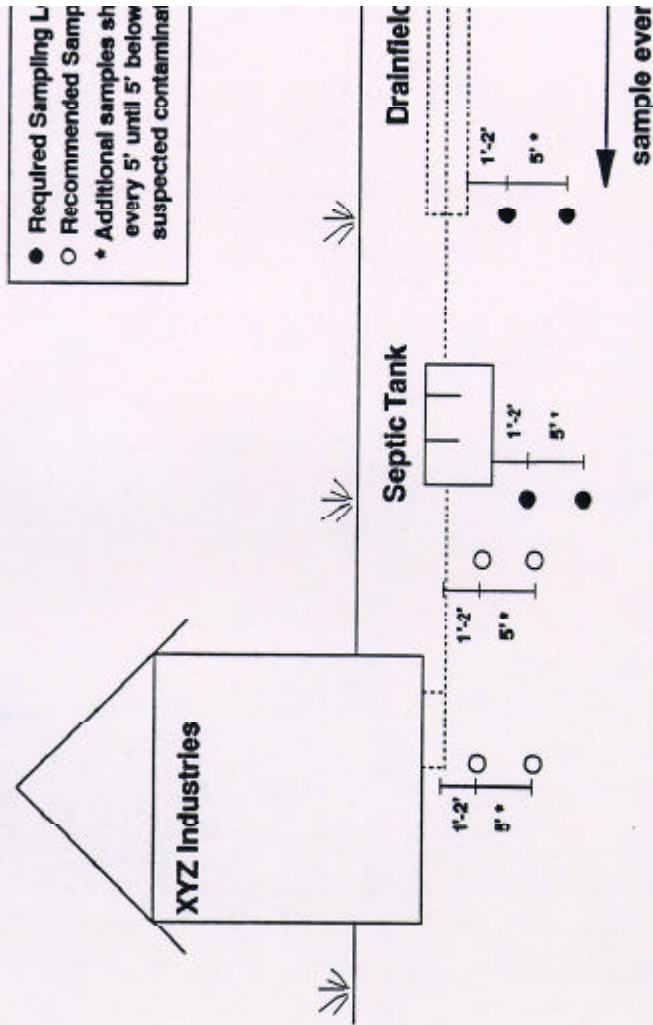


Figure A-2: Side View

The soil sample locations shown above meet the minimum requirements of the EPA UIC Program. The operator of the well is also responsible for meeting the requirements of all other applicable federal, state, and local regulations, and for adequately assessing the extent of any soil or ground water contamination.

Case B: Soil Sample Locations for a Septic System Receiving Only Industrial Wastes

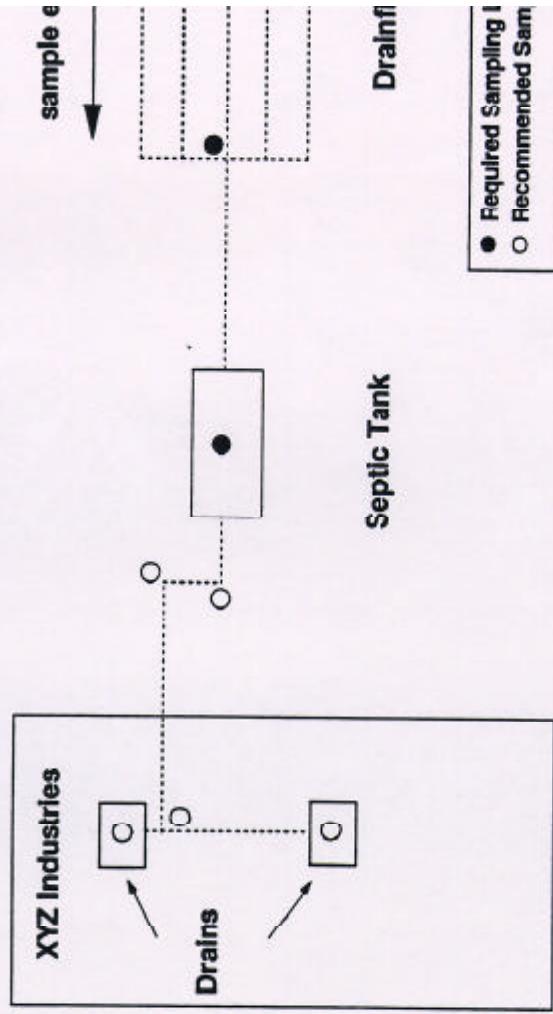


Figure B-1: Plan View

Note: The soil sample locations shown above meet the minimum requirements of the EPA UIC Program. The owner of the well is also responsible for meeting the requirements of all other applicable federal, state, and local laws, and for adequately assessing the extent of any soil or ground water contamination.

Case B: Soil Sample Locations for a Septic System Requiring Only Industrial Wastes

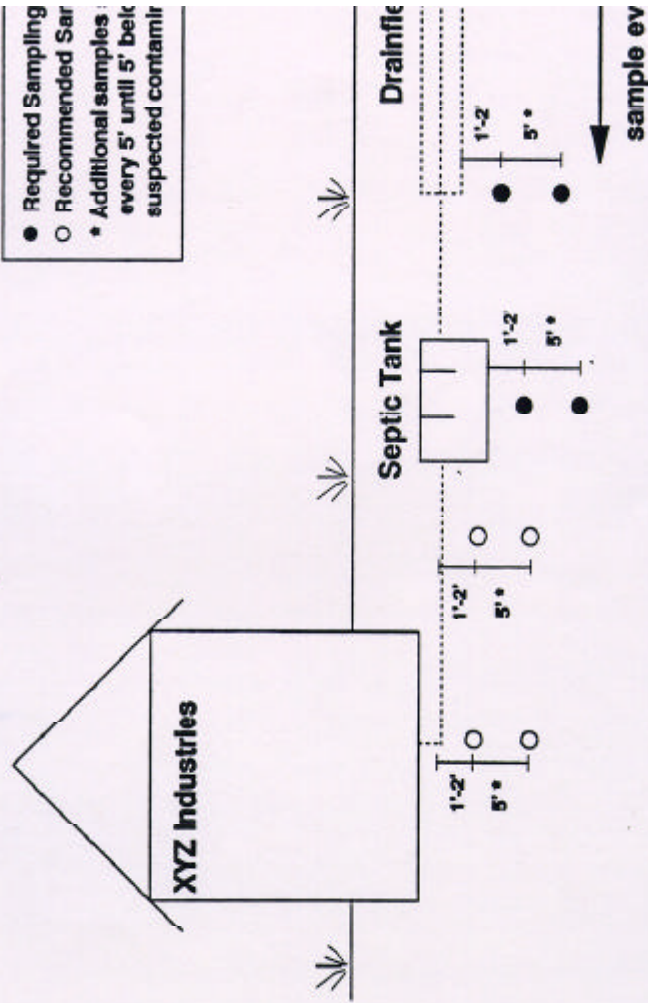


Figure B-2: Side View

Note: The soil sample locations shown above meet the minimum requirements of the EPA UIC Program and/or operator of the well is also responsible for meeting the requirements of all other applicable federal laws, and for adequately assessing the extent of any soil or ground water contamination.

Case C: Drywell, Cesspool, or Drainage Well Receiving Industrial and Sanitary Wastes or Only Industrial Wastes

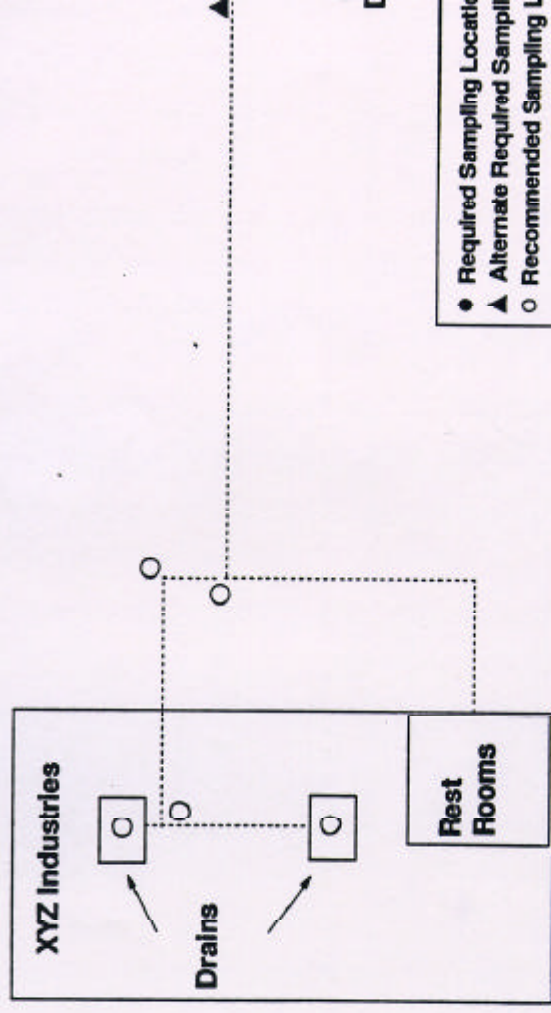


Figure C-1: Plan View

Note: The soil sample locations shown above meet the minimum requirements of the EPA UIC Program and/or operator of the well is also responsible for meeting the requirements of all other applicable federal, state, and local laws, and for adequately assessing the extent of any soil or ground water contamination.

Case C: Drywell, Cesspool, or Drainage Well Receiving Industrial and Sanitary Wastes or Only Industrial W.

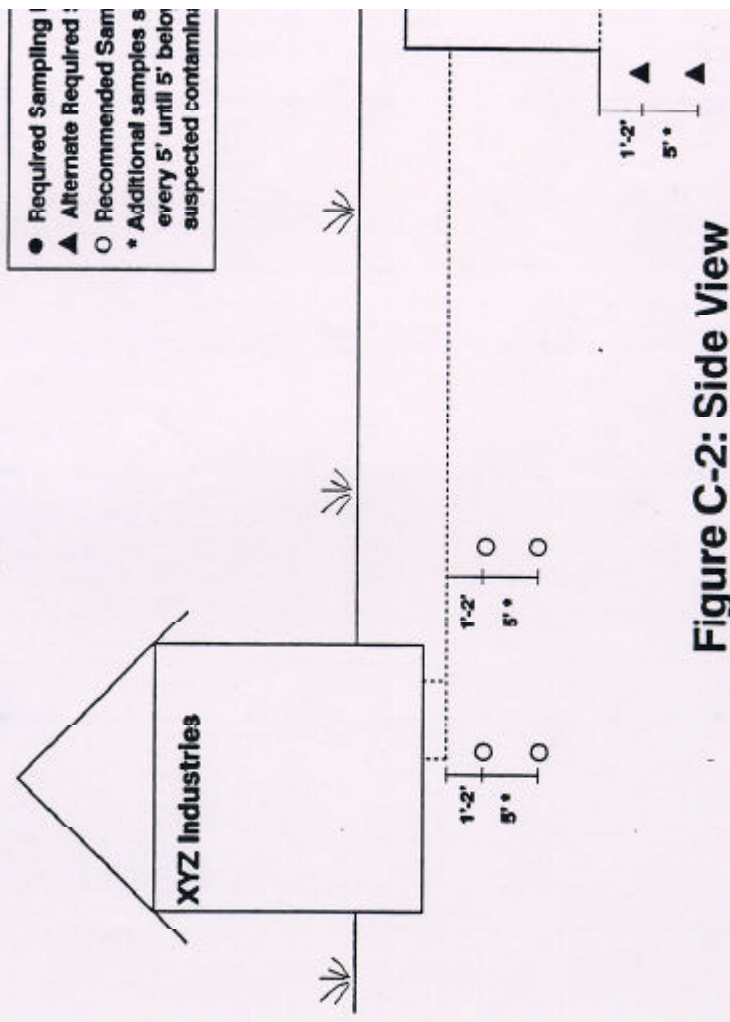


Figure C-2: Side View

Note: The soil sample locations shown above meet the minimum requirements of the EPA UIC Program and/or operator of the well is also responsible for meeting the requirements of all other applicable federal laws, and for adequately assessing the extent of any soil or ground water contamination.

Case D: Leachfield/Infiltration Gallery Receiving Both Industrial and Sanitary Wastes or Only Industrial Wastes

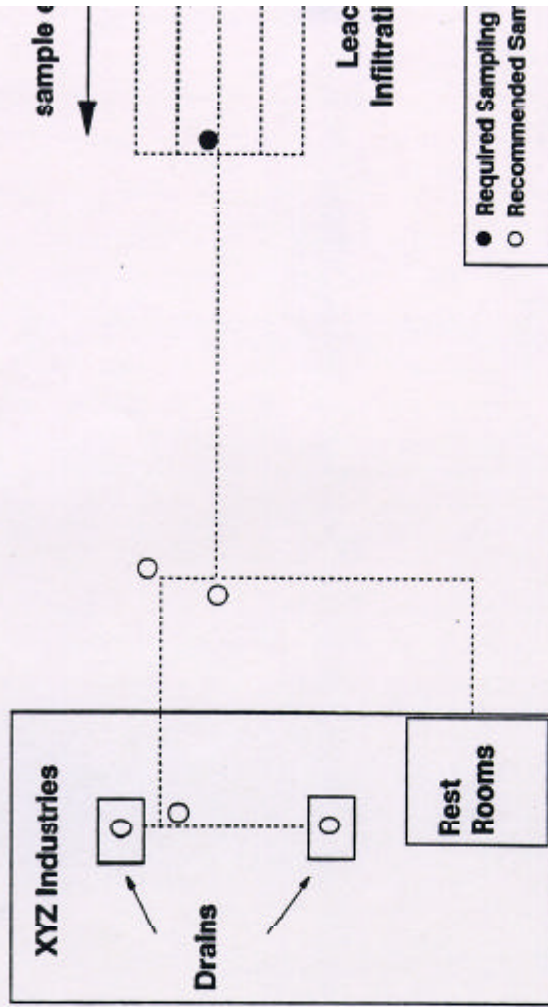


Figure D-1: Plan View

Note: The soil sample locations shown above meet the minimum requirements of the EPA UIC Program and/or operator of the well is also responsible for meeting the requirements of all other applicable federal, state, and local laws, and for adequately assessing the extent of any soil or ground water contamination.

Case D: Leachfield/Infiltration Gallery Receiving Both Industrial and Sanitary Wastes or Only Industrial Wastes

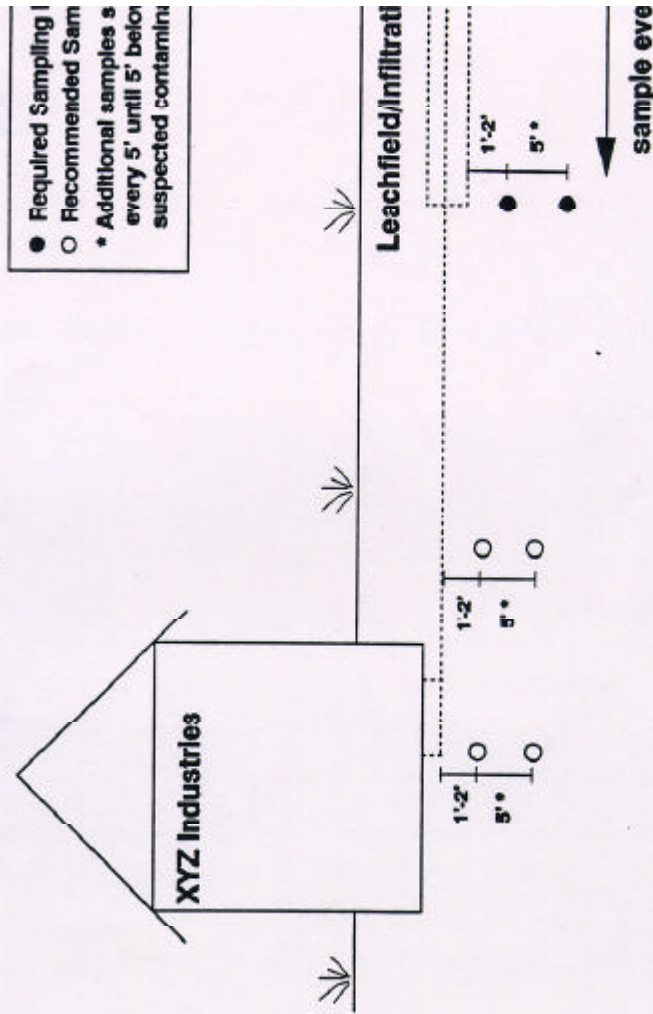


Figure D-2: Side View

Note: The soil sample locations shown above meet the minimum requirements of the EPA UIC Program and/or operator of the well is also responsible for meeting the requirements of all other applicable federal, state, and local laws, and for adequately assessing the extent of any soil or ground water contamination.

The pond sampler is used when the system is easily accessible and when the sampling point is deeper than arm's length. This sampling device consists of a telescoping aluminum rod to which a stainless steel or nalgene beaker is attached using an adjustable stainless steel C-clamp. The size of the beaker is determined by the volume and number of samples to be collected.

The bailer is useful for sampling from small diameter wells, septic tanks, and other areas where openings are too small to permit use of the pond sampler. A bailer is lowered into the fluid with a rope and retrieved with a sample of the fluid.

Weighted bottles or similar devices may be utilized to sample fluid at a depth below an oil/water interface. Such devices must be lowered below the floating product phase before opening. Fluid from below the interface may then be retrieved.

Often sediment samples from the bottom of a sump are collected using a beaker attached to a pond sampler. A stainless steel lab scoop is generally used to transfer the sediment from the beaker to the required container. Trowels and drive samplers are also used to collect samples.

In addition to the sampling equipment typically used to obtain samples, nalgene bottles for liquid sample transfer; certified organic-free, metal-free water for quality assurance blank samples; and instruments for measurement of fluid pH and temperature are used.

It is important to avoid using equipment or containers that may alter the sample through the introduction of foreign matter. Contaminated sampling equipment can result in leaching or particulate fallout, volatilization or adsorption of the sample.

4. Rinse with isopropyl alcohol (use a squirt bottle)
5. Rinse with deionized or distilled water (triple)
6. Rinse with certified organic free, metal-free water

C. Quality Assurance/Quality Control

Quality assurance (QA) is the process of assuring that data obtained are technically sound and properly documented. Quality control (QC) procedures are employed to measure the degree to which quality assurance objectives are met.

This document is intended to provide guidelines on some of the minimum requirements necessary to ensure the quality of the data produced by the sampling/analysis activities required by EPA prior to well closure. The regulated facilities are responsible for the quality of the data produced, and are expected to provide data of known, documented, and verifiable quality.

Following is a list of some of the quality control samples which can be employed. In general, at least one replicate sample, and one type of blank must be obtained for every ten field samples. And, if there are less than ten field sampling points, at least one replicate sample and one type of blank must be obtained.

1. Trip Blanks:

Trip blanks are used to detect contamination or cross-contamination which may have occurred during sample handling and transportation. These blanks must be prepared prior to the sampling effort and will accompany sample containers used during sampling and in the transport cooler. The trip blanks consist of certified metal-free, organic-free water and will be analyzed by a certified laboratory at the time the other samples are analyzed.

Replicate sampling is used to determine consistency in both sampling procedures and analytical methods. In general, replicate samples must be obtained at one out of every ten sampling points, and at least one replicate sample must be obtained if there are less than ten sampling points. To collect these samples, fluid is obtained from a sampling point and split between two identical containers. Both containers undergo the same method of analysis at the laboratory. The laboratory is not informed of the existence of QC samples.

In addition, split samples, spiked samples and field blanks are used for QA/QC purposes. These can be briefly described as follows:

4. Split Samples:

This is a sample that has been divided into two containers for analysis by separate laboratories. A split sample aids in identifying discrepancies in the laboratory's analytical techniques and procedures.

5. Spiked Samples:

This is a sample to which a known quantity of analyte(s) of interest has been added. Spiked samples are for the purpose of checking the accuracy of analytical procedures.

6. Field Blanks:

This is a sample of certified metal-free, organic-free water to which the same quantity of preservative is added as is added to the field samples. This type of sample provides a check on any contamination of chemical preservatives.

Volatile Organics) and 8020 (Aromatic Volatile Organics).

2. Semi-Volatile Organics: EPA Method 8270 (Semi-volatile Organics) is recommended when the presence of semi-volatile organics is suspected to be in the waste stream.
3. Metals: Appropriate EPA Methods for all metals on the Toxicity Characteristics (TC) list (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).
4. Total Petroleum Hydrocarbons (TPH) : EPA Methods 5030/8015 and 5030/8020 to analyze for gasoline in liquid or soil, EPA Method 3510/8015 for diesel in liquid, and EPA Method 3540/8015 for diesel in soil.
5. Total Recoverable Petroleum Hydrocarbons (TRPH): EPA Methods 9070A/418.1 for liquid and EPA Methods 9071A/9073 for soil.

Note: Some waste streams may contain additional constituents not covered by these methods. In those cases, additional EPA analytical methods must be employed to determine whether other constituents are present at concentrations which violate the primary drinking water standards or may otherwise adversely affect the health of persons. For literature regarding appropriate methods, see the reference section at the end of this document.

E. Sample Collection - Liquid and Sediment

1. Volatile Organics:

Samples for volatile organics are generally taken first to minimize the disturbance of the fluid and resulting loss of volatiles.

Additional sample volume may be needed to allow for each physical phase to be analyzed separately. Do not add HCl to samples that will be analyzed using the TCLP.

If a separate floating phase is encountered while sampling, a sampling device that collects fluid from beneath the floating phase should be used. This device is operated by gently lowering it in the closed position to a depth below the oil/water interface, carefully opening and filling it with sampling fluid, and then closing and retrieving the sample.

When transferring the sampling fluid from the sampling container to a VOA vial, the fluid must be poured slowly and smoothly to produce a meniscus over the lip of the vial. The screw-top lid with the Teflon septum is then tightened onto the vial, and the vial turned upside down and gently tapped to check for the presence of air bubbles. If air is trapped in the vial, i.e. head space is present, the sample must be retaken. VOA samples should not be taken near any exhaust systems which may cause contamination of the sample.

The samples should be tagged with an identification number, chilled to approximately 4°C in a cooler, and sent to a certified analytical laboratory.

2. Semi-Volatile Organics:

Samples for semi-volatile organics should be collected after those for volatile organics. The method of collection is the same as that described for volatiles. After the fluid is collected, it should be transferred with the aid of a funnel into a pre-labeled, one-liter glass bottle with a Teflon septum. The sample must be tagged and chilled to approximately 4°C for shipping to the analytical laboratory.

membrane filter.

- Total Metals - the concentration of metals determined on an unfiltered sample following vigorous digestion, or the sum of the concentrations of metals in both the dissolved and suspended fractions.
- Total Recoverable Metals - the concentration of metals in an unfiltered sample following treatment with hot dilute mineral acid.

Dissolved metals:

To evaluate the dissolved metal constituents, the sample must be filtered through a 0.45 micron membrane filter as soon as practicable after collection. Glass or plastic filtering apparatus using plain, non-grid marked membrane filters are recommended to avoid possible contamination. The first 50-100 ml of filtrate should be used to rinse the three-liter filter flask. The rinsate is discarded, and the flask used to collect the required volume of filtrate. Filtrate is then transferred to a one-liter, polyethylene, certified metal-free bottle provided by a lab, and the sample acidified with 1:1 redistilled nitric acid (HNO_3) to a pH of less than 2. Do not add HNO_3 to samples that will be analyzed for mercury or those that will be analyzed using the TCLP.

Suspended metals:

To determine the suspended metal constituents, a representative volume of unpreserved sample must be filtered through a 0.45 micron membrane filter. The volume filtered is recorded and the membrane filter containing the insoluble material is transferred to a container suitable for transport to an analytical laboratory.

Total metals:

Total metal constituents in a sample are determined by acidifying the unfiltered sample

bottom of a sump are collected using a beaker attached to a pond sampler. A stainless steel lab scoop is generally used to transfer the sediment from the beaker to the required container. Sediment samples should be placed in an 8-oz. wide-mouthed glass jar. The jar should be completely filled so that no headspace is present. After being taped and labeled, the sample should be placed immediately in an ice chest and kept cold (4°C) for delivery to the laboratory. Care should be taken throughout to avoid contamination of both the inside and outside of the jar and its contents.

4. Total Petroleum Hydrocarbons (TPH)

Injection Well Fluids and Sediment: Use collection methods described for sampling for semi-volatile organics. If sampling for TPH as gasoline, the fluid should be transferred to two pre-labeled 40-ml vials with Teflon septa (as described for volatile organics). If sampling for TPH as Diesel, the fluid should be transferred using a funnel to a pre-labeled, one-liter glass bottle with a Teflon septum. Preserve the sample by adding hydrochloric acid (HCl) to a pH of less than 2. The sample must be tagged and chilled to 4°C for shipping to the analytical laboratory.

5. Total Recoverable Petroleum Hydrocarbons (TRPH):

Injection Well Fluids and Sediment: Use the collection methods described for semi-volatile organics. The fluid should be transferred to a one-liter glass bottle with a Teflon septum. The sample must then be preserved, tagged and chilled as above.

F. Sample Collection - Soil

The bore hole can be made with a continuous flight or hollow stem auger, rotary core drill or other drilling method. It is recommended that core sampling equipment avoid the use of drilling fluids since these greatly increase the potential for sample contamination. Soil sampling kits are commercially available that can be used at relatively shallow depths to both drill the bore hole and collect a soil core. These units contain augers, coring tubes and sufficient drill rod extensions to sample up to depths of

exists (suspected worst-case locations) such as elbows, joints in pipe lines, clarifiers, floor drains, tanks and wells. Several depth borings should be planned to be sampled for chemical analysis. Sample intervals will vary, but in general should be taken between one and two feet beneath the excavation or the bottom of the septic tank, cesspool, well, pipe line or floor drain surface, and then every five feet to the water table, or until five feet past the last suspected contamination.

Upon retrieval from the borehole, the sample liners should be removed and placed on clean plastic. After each use, sampling equipment must be decontaminated. Sample liners should be separated with a clean steel knife and logged by an on-site geologist, using the Unified Soil Classification System.

After logging, the exposed ends of the liner should be covered. Typically, Teflon sheets and plastic end caps are used and secured with silicone-based tape. Sample labels should be written or attached securely to the end caps and should contain the following information: boring number, sample location, sample number, sample depth, date and time of sampling, name of sampler, and required analytical method. Sealed and labeled samples must be placed in cooled ice chests and shipped to the analytical laboratory.

TABLE I
SAMPLING METHODS
Recommended Sampling Containers, Preservation
Techniques, and Holding Times

Analysis Method	Fluid	Sediment and Soil	Preserve
Volatile Organics: -EPA 8240, -EPA 8260, or -EPA 8010, 8015, and 8020	Two 40-ml volatile organic analysis vials fitted with Teflon septa (VOA vials)	One 125-ml wide mouth glass jar with Teflon septum, or brass tube	Chill to 4°C For liquid sample pH < 2
Metals: Appropriate EPA methods for -Arsenic -Barium -Cadmium -Chromium -Lead -Selenium -Silver	One 1-liter polyethylene bottle	One 8-oz. wide mouth glass jar, or brass tube	Chill to 4°C For liquid sample pH < 2
Mercury: Appropriate EPA method	One 1-liter polyethylene bottle	One 8-oz. wide mouth glass jar, or brass tube	Chill to 4°C
Total Petroleum Hydrocarbons- Gasoline: -EPA 5030/8015 and 5030/8020 (liquid) -EPA 5030/8015 and 5030/8020 Diesel: -EPA 3510/8015 (liquid) -EPA 3540/8015 (oil)	Two 40-ml VOA vials (gasoline) or one 1-liter glass bottle with Teflon septum (diesel)	One 125-ml wide mouth glass jar with Teflon septum, or brass tube	Chill to 4°C For liquid sample pH < 2
Total Recoverable Petroleum Hydrocarbons: -EPA 9070A/418.1 (liquid) -EPA 9071A/9073 (soil)	One 1-liter glass jar with Teflon septum	One 8-oz. wide mouth glass jar with Teflon septum, or brass tube	Chill to 4°C For liquid sample pH < 2

note: Additional sample volume may be needed for quality control samples.

TABLE II
TCLP SAMPLING METHODS
Recommended Sampling Containers, Preservation
Techniques, and Holding Times

Analysis Method	Fluid	Sediment and Soil	Preser
Volatile Organics: -Appropriate TCLP methods	Two 40-ml volatile organic analysis vials fitted with Teflon septa (VOA vials) and two 1-liter amber glass bottles with Teflon septa	One 125-ml wide mouth glass jar with Teflon septum, or brass tube	Chill to 4°C
TCLP metals -Arsenic: 7060 -Barium: 6010 -Cadmium: 6010 -Chromium: 6010 -Lead: 7421 -Selenium: 7740 -Silver: 6010	One 1-liter polyethylene bottle	One 8-oz. wide mouth glass jar, or brass tube	Chill to 4°C
Mercury: 7470	One 1-liter polyethylene bottle	One 8-oz. wide mouth glass jar, or brass tube	Chill to 4°C

Notes:

The TCLP cannot be used with analytical methods for total petroleum hydrocarbons (TPH) and total recoverable petroleum hydrocarbons (TRPH).
Additional sample volume may be needed for quality control samples and for each physical phase to be analyzed separately.

- laboratory analysis.
- Sample loss or leakage during shipping or handling due to improper packaging
- Mislabelling
- Poor field records

H. Chain of Custody

The purpose of chain of custody procedures is to be able to trace possession of a sample from the time it is collected until it is potentially introduced as evidence in a legal proceeding.

A sample is in "custody" if:

- It is actually in one's actual physical possession
- It is in one's view
- It was in one's possession and it was secured so that it could not be tampered with.
- It is kept in a secured area with access restricted to authorized personnel only.
- It is placed in a container that is sealed with an official seal that will be broken when the container is opened.

Chain of custody documentation includes, but is not limited to, the entries in the sampler's field notebook, the official seals on the sampling containers and the chain of custody record. The inspector needs to assure that the relationship between the physical sample and the related documentation is clear, complete, and accurate. The sample number, date and time of sampling, location and sample type, preservative used, analysis required, and sampler's initials should appear on all documents.

When transferring the samples, the individual relinquishing and the individual receiving the sample must sign and record the date and time on the chain of custody record.

Characterization and Remediation.

Engineering Enterprises, Inc, March 1986. Sampling Document for USEPA Region IX Direct Implementation Program.

Engineering Enterprises, April 1988. Generic Plan for Injectate and Sediment Sampling at Class V Facilities in Region IX.

Engineering Enterprises, February 1989. Standard Operating Procedures for Injectate and Sediment Sampling at Class V Facilities in Region II.

Kern County Health Department and Kern County Fire Department. Requirements for Permanent Closure of Underground Hazardous Substance Storage Tanks.

Santa Clara Valley Water District, June 1989. Standards for the Construction and Destruction of Wells and other Deep Excavations in Santa Clara County.

Stanislaus County Underground Tank Program, September 1989. Stanislaus County Guidelines for Sampling and Site Investigations.

State of California, Leaking Underground Fuel Tank Task Force, December 1987. Leaking Underground Fuel Tank Field Manual: Guidelines for Site Assessment, Cleanup and Underground Storage Tank Closure.

State of California, Water Resources Control Board, August 1991. California Underground Storage Tank Regulations and Related Health and Safety Code Sections.

USEPA Region 9 Quality Assurance Management Section, October 1989. Preparation of a USEPA Region 9 Sampling and Analysis Plan for Private and State-Lead Superfund Projects (9QA -06-89).

USEPA Region 9 Quality Assurance Management Section, September 1989. USEPA Region 9 Guidance for Preparing Quality Assurance Project Plans for Superfund Remedial Projects (9QA-03-89).

USEPA, Methods for the Determination of Organic Compounds in Drinking Water, Doc. No. EPA 600/4-88-039.

USEPA, Region 9 Quality Assurance Management Section, January, 1990, Laboratory Documentation Requirements for Data Validation, Doc. No. 9QA-07-90.